

eRD6 question
EIC R&D Status meeting
January 24-25, 2019

Homework Q&A

BNL
Florida Institute of Technology
University of Virginia
Temple University

Question 1: *There is a total investment of ~\$1M into Temple University infrastructure to support GEM technology. What is the plan to make this investment available to the EIC?*

- Temple University through the College of Science and Technology (CST) provided dedicated laboratory space for EIC R&D / Micro-Pattern R&D work consisting of one large permanent Class 1,000 clean facility (~2,000 sq.ft.) and one detector lab (~1,000 sq.ft.) with basic maintenance provided by CST at no cost.
- In addition, various laboratory infrastructure items were provided through a generous donation including storage units and two dedicated 4' X 6' optical tables and one large 4' X 12' optical table from a recent faculty retirement.
- The EIC R&D program provided outstanding support for various infrastructure items including a CCD camera scanner, a large ultrasonic bath and other smaller scale laboratory equipment items used for EIC R&D work. The CCD camera scanner was designed by a mechanical engineer fully supported by CST who also had overseen the machining and assembly by the local CST machine shop.
- As suggested in one of the past EIC R&D committee closeout reports (See backup slide!), this facility can and should serve the wider EIC community. The Temple University group is committed to do so together with dedicated CST engineering and local workshop support.
- Examples of past, current and future envisaged micro-pattern facility center activities:
 - Hosting of several past EIC R&D meetings and the MPGD2017 conference series.
 - Usage of the CCD camera scanner for the wider micro-pattern community: Scan of
 1. UVa Chromium GEM foils
 2. BONUS GEM foils
 3. CERN GEM foils
 4. Korean commercial GEM foils
 - Testing and assembly of larger structures using optical tables
 - Setup of an outgassing facility
 - Graduate students are required to be trained in parts of the infrastructure serving the wider EIC community.
 - Increasing μ RWELL R&D program and other R&D activities.
 - EIC prototyping and construction phase
- The combination of dedicated university funding for infrastructure development and maintenance, in particular Clean Room maintenance and equipment support from the EIC R&D program provides a strong basis for the Temple University micro-pattern facility as a center for the EIC R&D community. The Temple University group is committed to provide and intensify this support in the future.
- The Temple University micro-pattern facility will be maintained between now, the continuing EIC R&D phase through the EIC prototyping phase until the actual EIC construction phase.

Question 2: *What coordination is there between the various μ RWELL efforts?*

Organized ourselves splitting up the work as presented in July 2018 during the last EIC R&D meeting:

- Development of **Cylindrical μ RWELL** for Barrel Tracker (UVa, FIT, TU)
 - **Simulations**: Temple University group
 - **Design**: FIT and UVa groups
 - **Preliminary studies on $10 \times 10 \text{ cm}^2$ planar prototypes**: UVa group (Cartesian readout) and FIT group (Zig-Zag readout)
- R&D for **TPC-type readout**: BNL group
- **Beam test**: All institutions!
- Regular remote meetings: Bi-weekly Monday, 9:00AM (EST)
- Propose to have our **future status / proposal reports structured by effort rather than by institution to emphasize the collaborative nature.**

Question 3: *What coordination is there between the various GEM efforts? How often do the different groups talk to each other?*

- Regular remote meetings: Bi-weekly Monday, 10:00AM (EST)
- Large-area GEM efforts for forward tracker at EIC focus on different assembly and readout schemes with a common GEM foil design (See backup slide!):
 - FIT: Purely mechanical construction and Zig-Zag readout.
 - UVa: U/V strip readout and light-weight frame material glued
 - TU: Commercial component testing and usage of light-weight material glued
- See introductory material for past R&D work in written proposal / status reports!

2015 Report

Backup Slide

The design of a “Common GEM Foil” that can be used by the different groups at Florida, Temple and University of Virginia in different configurations to study various issues such as frame design and assembly techniques promises to be of significant value. Examination of grid structures that could limit ion feedback also show significant promise.

Question 3

2017 Report

Recommendation:

While the committee supports finishing the shielding for and the commissioning of the X-ray test station as well as thorough cosmic ray testing of the triple GEM chambers, funds are limited and some prioritization is necessary. The committee also acknowledges the use of the Temple laboratory as a resource for the entire EIC GEM community and looks forward to increased co-operation with other members of the EIC community. Temple has established its reputation as a major player in the area of MPGD detectors. As noted before, the proposed R&D program falls more in the area of PED. This program has been supported generously by the EIC R&D program to date. It has also been noted that this support should be seen as seed funding to develop ongoing base funding. Given the success of the group to date, securing base funding should be possible and is encouraged.

Question 1

2018 Report

Recommendation:

The committee commends the collaboration for its significant contributions to the development of the MPGD program. Temple has established itself as a resource for the entire MPGD community and we recommend that the group actively maintain its support to the MPGD community.

Question 1